Rapportinformatie

Titel: Biofilm prevention and shock disinfection test in irrigation pipes
Projectnummer: 3742363900
Auteur(s): Zejia Zheng, Ariyati Ayik, Marco Hofman, Jim van Ruijven
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Biofilm removal test in irrigation pipes under the application of EcoClearProx[1]

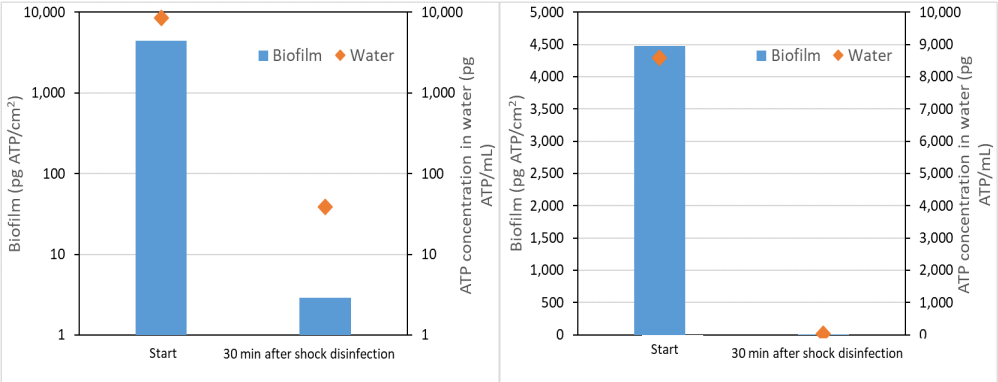
Introduction

Managing biofilms in irrigation lines is essential for achieving Zero Liquid Discharge cultivation systems, an objective set for Dutch greenhouse horticulture by 2027. Various methods are currently employed to either inhibit biofilm formation or clean irrigation lines during the growing season or at crop interchange. Wageningen University & Research Greenhouse Horticulture (WUR-GH) has developed a standardized installation and protocol designed for generating a controlled biofilm under horticultural conditions, enabling systematic testing of biofilm management strategies.
The biofilm formation protocol operates under conditions optimized for horticulture, using a tomato nutrient solution inoculated with microorganisms derived from drain water at 24°C. The system circulates water through a 50-meter irrigation line before directing it through a biofilm monitoring chamber, where biofilms develop on rings made from the same material as the irrigation piping. Biofilm growth is quantitatively monitored through ATP measurements, which indicate active cellular presence. This installation facilitates the assessment of various biofilm removal techniques and agents for their efficacy against biofilms.
TMRW Eco B.V. did utilize this controlled testing system to evaluate the biofilm removal efficacy of their disinfection agent, EcoClearProx.

[1] Data came from the project "Biofilm prevention and shock disinfection test in irrigation pipes", detailed description of the results can be found in the report WPR-1371.

Removal

In this study, a 6% EcoClearProx solution was applied to an established biofilm to assess its biofilm removal efficacy. Prior to treatment, irrigation water was recirculated within the system for a period of 9 days to ensure sufficient biofilm development. Adenosine triphosphate (ATP) measurements confirmed biofilm presence, with initial concentrations recorded at 4,480 pg ATP/cm² on biofilm surfaces and 8,585 pg ATP/mL in water samples. Following a 30-minute treatment with 6% EcoClearProx, ATP levels decreased sharply in both biofilm and water samples, with ATP concentration in biofilm samples reducing from 4,480 to 2.9 pg ATP/cm² and in water samples from 8,585 to 38.8 pg ATP/mL. The pronounced reduction in ATP levels after treatment confirms the efficacy of EcoClearProx at high concentrations (>100 mg/L H_2O_2) in effectively disrupting and removing established biofilm.



Conclusion

Data derived from this study indicated a significant reduction in ATP concentration following a 30-minute application of 6% EcoClearProx, demonstrating its efficacy in removing established biofilm at high concentrations (>100 mg/L H_2O_2).

Contact
Wageningen University & Research, BU Glastuinbouw
Postbus 20, 2665 MV Bleiswijk
Violierenweg 1, 2665 MV Bleiswijk

glastuinbouw@wur.nl
M +31 (0)317 46 56 06
www.wur.nl/glastuinbouw